QUARTER REPORT
ON THE PROJECT

Study of Leukemia and Other Hematologic Diseases Among Cleanup Workers in Ukraine Following the Chornobyl Accident

(time period from 1.01.2001 to 31.03.2001)

Task A. Specify methods for the buccal cells collection and storage.
A 1. Acquaint with the methods of the buccal cells collection and storage.

At present there are some methods of collection and storage of the buccal mucosal cells of the high-dose group. They are as follows: mouthwash and buccal swab technique.

The discussion is being carried out with Dr. Finch and his colleagues as to selection of the adequate method. Testing is anticipated for the next quarter.

B. Improvement and validation of RADRUE method.

The current state of the intercomparison exercise is following:

- clean-up workers selected to be the subjects of the intercomparison have been identified and traced;
- 39 (out of 40) of the EPR doses have been estimated;
- the issues of logistic support (fees for interviewers and bonuses for interviewees) were finally resolved during Dr.Howe's visit in the beginning of March;
- necessary arrangements with the qualified interviewer are established;
- interviews themselves can start as soon as epidemiological branch of the project will set up the scene for interviews (call the subjects, arrange workplace for interviewer).

At a March meeting with Dr.Howe it was decided that 10 of 50 subjects of the comparison should be proxies. Since no additional funds are assumed, we are planning to do 40 interviews for clean-up workers and 10 interview of proxies (by two proxies for 5 clean-up worker: both a colleague and a relative of him).

Discussion regarding modification of a RADRUE software done by Dr.V.Kryuchkov and standards of interviewing will be held in Kiev at the beginning of April with participation of A.Tsykalo, the expert dosimetrist, and Mrs.N.Gurova, the expert interviewer.

Preparation of the dosimetry questionnaire

The interviews that have been conducted so far to validate the RADRUE method indicate that the IARC questionnaire needs to be improved. Mr.Tsykalo was requested to provide his suggestions concerning improvement of the dosimetry questionnaire. It was

decided that, as the intermediate action, modifications will be collected separately in a form of addendum to the conventional IARC questionnaire, containing a list of additional questions which should facilitate analysis by RADRUE. In later time a new version of integral questionnaire will be developed by removal of abundant questions from the original IARC form.

A full revised version of the dosimetry questionnaire will be available by the 21-25 May meeting. The interviews to be carried out within the current intercomparison exercise will be done with the revised IARC questionnaire (i.e. existing version + addendum).

Task D. Obtain data for the Leukemia Registry from each oblast.

A work was in progress according to the schedule for the local personnel of the Dnipropetrovsk, Kyiv, Cherkasy, Chernihiv, Kharkiv oblasts and Kyiv-city on the cases of the diseases under study. The work on missions is reflected in the reports.

During the quarter twelve missions to the oblasts were made for consulting, to provide operational support materials and DCF copies, to discuss problems arising during the work, for quality control by filling out control DCF's in the scope of 8% of the original sampling.

Moreover, during the missions additional sources of information were studied to form the Leukemia Registry involving out-patient departments of the oncological dispensaries, Specialized Medical Expert Commission (SMEC) and feasibility to use them.

D3. Filling out DCFs' according to the developed schedule, filled forms transportation to the RCRM, their registration and archiving.

According to the schedule compiled by the curators of the oblasts from the RCRM groups and agreed with local personnel the work was in progress with the information sources at medical institutions of the target oblasts of Ukraine. In Tables 1& 2 the scope of work performed an each institution is presented (the number of the DCF and CDCF filled out for the Leukemia Registry).

The DCF were filled out by the technicians trained for this work under the guidance of a hematologist and a supervisor according to the Instruction.

The problems arising during the work were solved with the help of the RCRM team members responsible for the oblasts.

DCF and CDCF were transferred from the oblasts to the RCRM according to the Operations manual.

27,237 DCF and CDCF were received, registered and arranged in special folders in the epidemiology group as of April,.Ol, 2001 (Tables 1 & 2).

<div align="right">**Table 1.**</div>

Distribution of DCF and CDCF filled out in oblasts for the whole period including period from 01.01.2001 to 01.04.2001 and percentage ratio to the scope of work to be done

Oblast code	Oblast	From 3 01.01.2001 to 01.04.2001			Whole period			Scope of work to be done	% rate
		DCF	CDCF	Total	DCF	CDCF	Total		
04	Dnipropetrovsk oblast	2101	266	2367	4122	478	4600	6300	65 %
10	Kyiv oblast	2132	188	2320	3645	430	4075	5768	63 %
20	Kharkiv oblast	1626	340	I966	2788	449	3237	4760	59 %
23	Cherkasy oblast	129	872	*1001*	3285	1296	4.581	2100	156% *
25	Chernihiv oblast	1036	I20	*1156*	1812	188	2000	2100	86%
26	Kyiv city	2254	483	2737	7646	1098	8737	12600	61%
Total:		*9278*	*2269*	*11547*	*23298*	*3939*	27237	33628	**69 %**

*numbers for Cherkasy oblast reflect repeated data sampling because of not-sufficient percentage of errors in the primary fliied DCFs'.

As it is seen from the data the work is to be completed as it was planned by the project time schedule in 10 months.

Distribution of the DCF and CDCF according to the medical institutions is presented at Table 2.

Fig.1 shows dynamics of the DCF and CDCF received according to the months.

Table 2

Number of DCF & CDCF filled in medical institutions during time period from 01.06.2000 to 01.04.2001.

Institution code	Institution	DCF	CDCF	Total
1	2	3	4	5
0401	Dnipropetrovsk local hospital № 11	958	107	1065
0402	Dnipropetrovsk local hospital № 4	836	119	955
0405	Dniprodzerzynsk local hospital № 9	998	104	1102
0406	Krivy Rih local hospital № 4	1330	148	1478
:	**Dnipropetrovsk oblast**	**4122**	**478**	**4600**
1001	Kyiv oblast hospital № 1	2113	174	2287
1002	Kyiv oblast hospital № 2	1151	232	1383
1003	Kyiv oblast hospital oncological diapensary	381	24	405
	Kyiv oblast	**3645**	**430**	**4075**
2001	Kharkiv oblast oncological dispensary	1964	300	2264
2002	Kharkiv hospital for railway transport workers	483	70	553
2003	Kharkiv institute of medical radiology	341	79	420
	Kharkiv oblast	**2788**	**449**	**3237**
2301	Cherkasy oblast oncology dispensary	3285	1296	4581
	Cherkasy oblast	**3285**	**1296**	**4581**
2501	Chernihiv oblast oncology dispensary	1812	188	2000
	Chernihiv oblast	**1812**	**188**	**2000**
2601	Kyiv local hospital № 9	3574	818	4392
2602	Central military hospital of MD of Ukraine	718	55	773
2603	Research Center for Radiation Medicine	1884	155	2039
2604	Ukranian institute of oncology & radiology	665	70	735
2607	Kyiv local oncology hospital	694		694
2610	Local hospital (№ 7or № 5) hematology office	111		111
	Kyiv city	**7646**	**1098**	**8744**
	TOTAL:	*23298*	*3939*	*27237*
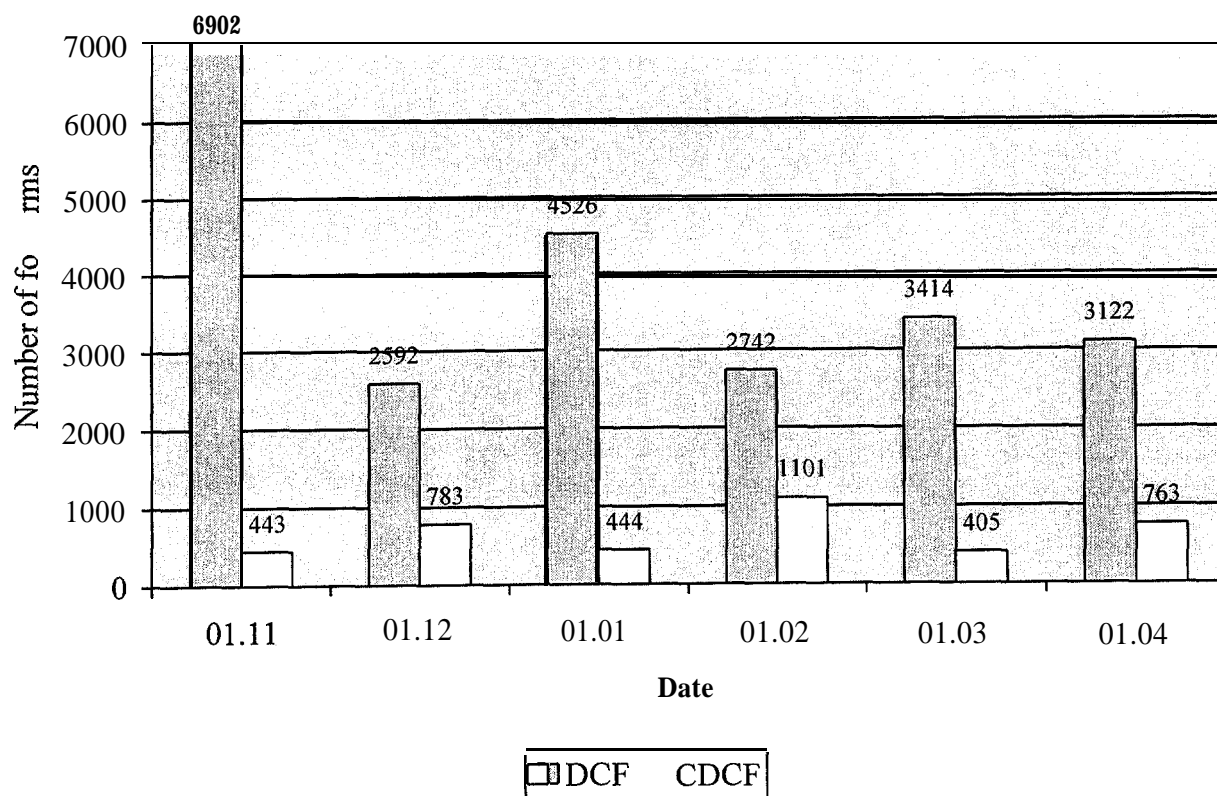
Figure 1. Dynamics of the delivery of DCF & CDCF to the epidemiology group (per month)

D.7. Data Input from the Filled out DCF into the Leukemia Registry Database.

At present data input is performed using three computers by three operators. Computer network is being maintained at present which is to be completed by April, 10, 2001. There is no delay as to the data input.

D. 8-9. Prepare specification and software for the automated juxtaposition of the DCF and CDCF.

The range and consistency check of the data available in the DB is aimed to improve the information quality using automated processing due to the elaborated algorithms providing for:

- possible errors revealing while filling out the forms;

- forming entry arrays for the Data Collection Forms (DCF) and Control Data Collection Forms (CDCF) containing erroneous data;

- forming hard copies of such entries for manual check with original paper sources to make decisions as to correction of the errors revealed;

- separately reveal the errors in DB data caused by the operators' subjective factor during data input (operators' personal errors) and those made while filling out primary documents at the local medical institutions;

- Statistical characterization of the error distribution in the columns for the following fields: Form executor, Institution code, oblast code, data input operator, etc.

In fact, the range and consistency check in this DB is two-staged one since some of its elements are automatically performed already at the data input stage.

It is due to the fact that the data in some columns are digits. In other words, no other data except digits can be input in such columns as it is shown in Table 3.

Table № 3

Field No	Field denomination	Fiield name	Field format	
1	Institution code	code_hosp	Numeric	4:o
2	Source code	code_input	Numeric	1:0
3	Year	Year	Numeric	4:0
4	Case history №	Number_his	Numeric	9:0
5	Page №	Number_pag	Numeric	3:0
6	Recording (row) №	Number_row	Numeric	1:0
7	Surname	name1	Character	16
8	Name	name2	Character	16
9	Patronymic	name3	Character	16
10	Birth date (day)	date_day_b	Numeric	2:0
11	Birth date (month)	date_man_b	Numeric	2:0
12	Birth date (year)	date_yr_b	Numeric	4:0
13	Age	Old	Numeric	2:0
14	Oblast code	code_obl	Numeric	2:0
15	Region	Region	Character	16
16	Settlement	Towrn	Character	16
17	Street	Street	Character	16
18	House	Home	Character	6
19	Apartment	Appartment	Numeric	3:0
10	Phone	Telephone	Numeric	7:0
21	Clean-up worker status	Status	Numeric	1:0
22	Admission date (day)	date_day_i	numeric	2:0
23	Admission date (month)	date_man_i	numeric	2:0
24	Admission date (year)	date_yr_i	numeric	4:0
25	Discharge date (day)	date_day_o	numeric	2:0
26	Discharge date (month)	date_man_o	numeric	2:0
27	Discharge date (year)	date_yr_o	numeric	4:0
28	Date of death (day)	date_day_d	numeric	2:0
29	Date of death (month)	date_man_d	numeric	2:0

30	I Date of death (year)	date yr d	numeric	4:o
31	Diagnosis	Diagnosis	character	128
32	Diagnosis code	code diaa	numeric	I 3:o
33	Diagnosis type	type diag	numeric	1:0
34	I Form executor	Author	character	3
35	date (day) of filling out	date_day_r	numeric	2:o
36	date (month) of filling out	date_man_r	numeric	2:o
37	date (year) of filling out	date_yr_r	numeric	4:o
38	Data input to Data Base	Date	date	8
39	System number	Sysnumber	character	32
40	Reserve	reserv 1	character	32
41	Reserve	reserv2	character	32

Besides, as it is shown in the Table all the fields have fixed length, which also enables to control automatically length of the entry at the input stage. For example if a field has data format "Date" (table field 38) then nothing except date can be input there. While this, the date itself will be automatically checked, the day number not exceeding 3 1, month number – not more than 12 and year – up to 9999.

The whole data quality control procedure consists of separate procedures with respective codes presented below. Since the data concerning the Data Collection Forms and Control Data Collection Forms are of the same structure, the elaborated and tested procedures can be repeatedly applied for one or other data check.

The appropriate algorithms and their software realization for this BD are described below. The procedures are presented according to the field arrangement at Table 3.

To enable check documentation a special working file was applied having just the same information fields set as the DCF& CDCF except for their numeric presentation with nonzero digit number being equal to 1.

The logic of filling out the numerical fields in this file for each control entry is that in case of successful check "1" is placed in the related field. In case of the check failure "0" is placed in the field of the working file except for the field containing system number.

Thus, the number of the entries in the working file will be the same as in the control sampling, and the number of "0" and "1" will indicate the percent judgement of the range and consistency check for each entry.

Subsequently, such file will enable to search quickly not only for the entries having no range and consistency check including initial paper documents but also for the fields where conditions of the check above were not fulfilled. Further this information may be required for more detailed studies aimed at identifying regularities of the errors origin and consequently, to develop possible mechanism for their compensation.

The algorithms and their software realization in DB will be reviewed below.

1. Institution code check

The present procedure was elaborated on the basis of assumption that the data base is compiled using the information received from medical institutions of six oblasts. Both medical institution and oblast have its own two-digit code, so every institution is uniquely identified using four-digit code as it is shown in first column of Table 4.

As the table shows, the institution code is compiled via concatenation of the relative two-digit codes of the institution own code and oblast code).

Thus, to check the consistency of the field filling out the following is to be successively checked:

1. the availability of the entry itself, i.e. if the field is not empty at all;

2. the input numeric data should correspond to the digits placed in first column of Table 2. Unless even one of these conditions is fulfilled, the error is fixed ("0" is placed in the given field of the working file).

Table 4

Institution code	Institution name	Oblast
401	Dnipropetrovsk city clinical hospital № 11	Dnipropetrovsk
402	Dnipropetrovsk city clinical hospital № 4	Dnipropetrovsk
403	Dnipropetrovsk oblast clinical oncology dispensary	Dnipropetrovsk
404	Dnipropetrovsk. Hospital for railway transport workers	Dnipropetrovsk
405	Dniprodzerjynsk. City hospital № 9	Dnipropetrovsk
406	Krivy Rih. Hospital № 9	Dnipropetrovsk
407	SMEC	Dnipropetrovsk
2001	Kharkiv oblast clinical oncology dispensary	Kharkiv
2002	Kharkiv. Hospital for railway transport workers	Kharkiv
2003	Kharkiv institute for Medical Radiology	Kharkiv
2004	SMEC	Kharkiv
2301	Cherkasy oblast oncology dispensary	Cherkasy
2501	Chernihiv oblast oncology dispensary	Chernihiv
2601	Kiev city clinical hospital № 9	Kyiv city
2602	Ukraine Arms Forces Central Hospital	Kyiv city
2603	Research Center for Radiation Medicine	Kyiv city
2604	Institute for Oncology & Radiology	Kyiv city
2605	SMEC	Kyiv city
2606	Central SMEC	Kyiv city
2607	Kyiv city oncology medical center	Kyiv city
2608	Hospital for railway transport workers	Kyiv city
2609	Central hospital LOO (Pheophania)	Kyiv city
1001	Kyiv oblast clinical hospital №1	Kyiv
1002	Kyiv oblast clinical hospital №2	Kyiv

1003	Kyiv oblast oncology dispensary	Kyiv

The procedure of such check is described in Annex 1. (Procedure No. 1).

This procedure like all subsequent ones was developed as applied for the software Visual FoxPro 6.0 using the structured inquiry language SQL being in force at that time.

Here "MainForm" is the open table pseudonym, which contains array of the collected initial data related to the Data Collection Form. "Code_Hosp" is name of the field to be analyzed.

At the initial stage of the studies of such kind it is expedient to explore the cause and effect of the errors arising in the entry fields irrespective of the other fields of the entry analyzed. The appropriate form of information presentation & selection required for the analysis was elaborated.

Here parameter al is the key to select and perform just such check. It is defined as "1" by the operator conducting quality control. Al is equal to zero if such check is not chosen.

B1 parameter is conjugated with this check and is capable of taking only two values: 0 & 1. In case this parameter equals zero it means that there was no range and consistency check of the information in this field.

Thus, as a result of simultaneous checks by operator, the entry of the working file will consist of "0" and "1" sequence with "1" corresponding to the correct field filling out and "0" to the wrong one. If all fields of this entry contain "1" it means that the entry has successfully passed the range and consistency check. In only one "0" is present in the entry the error is fixed and the entry is marked as the one which failed to pass the check.

Further all these entries or rather corresponding entries from the main file "MainForm" can be printed out to make decision as to correction of the related fields.

Similar procedure is applied to check all other fields in the entry except for the algorithm used to check the content of the field analyzed. Therefore, below is brief description of the check algorithm and respective code for all other fields to be checked.

2. Source code check

According to the initial data the item of the check is that the given field can be filled out only using one digit and its value must be within the range from 1 to 5. Further it is assumed that the number of the information sources may be increased up to 7. At present the number of information sources does not exceed 5 and analysis is conducted taking into consideration this assumption.

The fact that the information is numerical one and is expressed by one digit is carried out automatically at the input stage. Therefore, using the software it is necessary to check if the field is not empty or whether the digit input by an operator is in the range from 1 to 5.

The procedure for such check is presented in Annex 1 (Procedure No.2)

Value a2 & b2 are designed for solution of the tasks analogous to those presented above. Since these parameters' functions are equal for all subsequent procedures, they will not be later mentioned if not necessary.

3. Year value check

According to the initial data the year entry should be within 1987 . . . 2000 range.

It's also a numerical field containing 4 significant digits, therefore its range and consistency check must be carried out according to Procedure No.3 (Annex 1).

4. Case record number check

The procedure in this software version is analogous to the procedure "Year value check" except for the significant digit number equal to 9.

In case when the medical record number is composed of two digit sets with oblique stroke ("/") between them, the operator is to only input the first part of the number, i.e. digits to the left from the oblique stroke, Procedure No.4.

5. Page number check

Page number check is analogous to the earlier described procedure. It is procedure No.5

6. Entry number check

Entry number check (also the numeric field with single significant digit) is carried out as follows. If the field is not empty it is checked for the recorded digit being equal to zero. If this term is fulfilled the erroneous entry is fixed, Procedure No.6.

7. Surname check

Beginning with this parameter and up to the one No.34 (executive person initials) under certain conditions these fields may not be filled in at all and that will not be an error. According to the definition such condition is when more than one DCF or CDCF are filled out for one entry, i.e. such case is possible when parameter "MainForm.Number_Row" acquires value exceeding 1.

Hence, all subsequent checks are to take into account this term. In other words, if parameter "MainForm.Number_Row" exceeds 1, unfilled or zero fields are not to be considered false for such checks.

Besides, the number of such entries is of interest itself since it characterizes quality of the technicians' work.

To give positive reply to this question the forms in the database were analyzed having such numbers.

On the whole the database contained as of February, 200 1:

Data Collection Forms —   **17,139;**
Control Data Collection Forms -   **2,209.**
CDCF percent ratio —   **12.89%**

Distribution of the forms of both types was as follows, Table 5:

Table № 5

Entry No. (MainForm. Number_ Row)	Data Collection Forms		Control Data Collection Forms	
	Total	**in %**	**Total**	**in %**
0	23	0.13	9	0.40
1	**16803**	98.04	2152	97.42
2	273	1.59	46	2.08
3	28	0.16	1	0.05
4	8	0.05	1	0.05
5	3	0.02	0	0.00
6	1	0.01	0	0.00
7	0	0.00	0	0.00
TOTAL:	**17139**	**100.00**	2209	**100.00**

As it is seen from the table there are forms having unfilled (or zero) field "Number-Row".

Since no such forms were accepted from the institutions where they had been filled out evidently it means the operator's error.

The availability of such entries (about 2.. .3 %) indicates that it should be taken into account while conducting the range and consistency check.

Therefore, all subsequent procedures should take these parameters (up to No.34 — executive person initials) into account while checking.

Procedure No.7 for this check is also presented in Annex 1. Here the operator "Case Between (InNumberRows,0, 1) checks that parameter InNumberRows being equal to the entry number is within the range of 0 . . . 1. The first value is unsolved and obviously related to the operator's error, the second is a possible one. Consequently, if field "Surname" for this case is empty, the error is to be fixed ($b7=0$), if this field is filled out the error is absent ($b7=1$). Check of this symbol field and other similar symbol ones as to availability of one or several digits is not conducted at this stage of the range and consistency check because such event is unlikely.

According to the terms of the operators' work the symbol data input is conducted on the keyboard main pad and numeric ones — on the right (numeric) pad. That's why casual digit input instead of letters is practically impossible.

8. Name check

This parameter is also purely symbolic one and limited only by the field width. Procedure No.8 for this check is analogous to the one described above.

9. Patronymic check

Procedure No.9 also corresponds to the two ones described above.

10. Birth data check

This check actually involves several checks. First of all successive checks of date, month and year of birth are conducted with three terms being taken into account:

- not the first (not zero) entry is analyzed (field No.6);
- there is an interdependence of the digits in the field between birth day and month and in the month field — year of birth if such information is presented completely i.e. in case that these fields are not empty and are not 99, 999, 9999;
- possibility was assumed that there could be numbers 99, 999 and 9999 in the field entries for day, month and year of birth, respectively.

The successive check above of the birth date, month and year fields is carried out according to Procedure No.10. This Procedure is specific one since it contains three additional procedures and each of them is responsible for the date, month and year of birth check. These

Procedures have their own names as follows: CaseDayBorn(),CaseMonthBom() and CaseYearBorn().

Procedure CaseYearBom() additionally takes into account the permissible values range of year of birth and is in accordance with the Instruction as to filling out Data Collection Forms & Control Data Collection Forms.

Furthermore, while filling out the form there is a possibility to fill out only one field - "year of birth". In such a case error is not fixed either. This code has number 10 and procedures checking consistency of filling out fields "day", "month" and "year of birth" — 11, 12 & 13, respectively.

11. Age value check

Age value check is performed using the algorithm according to the following Table No.6.

Table № 6

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Age Range	17-62	17-63	17-64	17-65	18-66	19-67	20-68	21--69	22-70	23-71	24-72	25-73	26-74	27-75

The code realizing the algorithm is given in Procedure No.14.

12. Address check

Address check in this PC software version includes only one check — of the oblast code. Oblast code is to satisfy the following terms:

To be the two-digit number

Do not differ from the number row 04, 10, 20, 23, 25, 26.

This is Procedure No. 15.

13. Clean-up Worker status check

Verification of the clean-up worker status is to check that the digit in this field is equal to "1" or "2". All other values are excluded. This is Procedure No. 16.

14. Admission date check

The procedure to check the admission date is analogous to the Procedure of birth date check with one exception: Table No.4 is not valid here. This is procedure No.17. It also

involves three sub-programs checking day, month and year of admission, respectively. — These are procedures No. 18, 19 & 20.

The last Procedure (No.20) concerning year CaseYearInput() checks the number recorded in this field for values range (1987 . . . 2000) and possible value 9999.

15. Discharge date check

The procedure of the discharge date is designed similar to the preceding procedures 17, 18, 19 & 20. Their numbers are 21, 22, 23 & 24, respectively.

16. Date of death check

The procedure of the date of death check is designed similarly to the previous one, The sub-program numbers are 25, 26, 27 & 28, respectively

17. Diagnosis check

Diagnosis check is performed only regarding its availability. In this software version no any syntax analysis is provided. Procedure code is No. 29.

18. Diagnosis code check

This procedure is to check conformity between input number and three-digit range. At present this range is 1 . . . 136. This is procedure No.30.

19. Diagnosis type check

Diagnosis type also has the field with the numeric value ranging from 1 to 3. This is procedure No.3 1.

20. Executive person's initials check

This field is always to be filled out with the executive person's initials being presented with three letters. This is procedure No.32.

21. Filling out date check

The algorithm to check DCF filling out date is similar to the algorithms for checking fields containing information on the dates. The only exception is that the year check is limited by2001 . . . 2001. This is procedure No. 33. Its sub-programs are Nos. 34, 35 & 36.

Since the data concerning dates have not been brought in accordance with the paper documents the procedure checking date consistency will be presented later.

The Results of the Preparatory Stage of the Range and Consistency Check

Of the Data Collection Forms & Control Data Collection Forms
For the Leukemia Registry

(As of February 1, 2001)

Total amount of the analyzed entries in the database:

- Data Collection Forms — 17,139;

- Control Data Collection Forms — 2,207.

The analysis was carried out separately concerning each field for every form type without any relation with the entries in other fields.

Table №7

Field No.	Field denomination	Data Collection Forms		Control Data Collection Forms	
		Absolute value	%	Absolute value	%
1	Institution code	38	0.22	2	0.09
2	Source code	6	0.04	0	0.00
3	Year	11	0.06	1	0.05
4	Medical record No.	144	0.84	28	1.27
5	Page No.	1	0.006	0	0.00
6	Entry No.	23	0.13	7	0.32
7	Surname	3	0.02	1	0.05
8	Name	14	0.08	4	0.18
9	Patronymic	32	0.19	5	0.23
10	Birth date	1571	9.17	186	8.43
11	Age	7841	45.74	716	32.44
13	Oblast Code	1930	11.26	298	13.15
13	Clean-up worker status	1694	9.88	61	2.76
14	Date of admission	84	0.49	13	0.59
15	Discharge date	991	5.78	56	2.54
16	Death date	4747	7.69	259	11.73
17	Diagnosis	261	1.52	49	2.22
18	Diagnosis code	226	1.32	57	2.58
19	Diagnosis type	264	1.54	51	2.31

20	Executive person	2445	14.27	2	0.09
21	Date of filling out	175	1.02	4	0.18
	Average for all fields	7137	6,25	1805	3,89

The table shows the initial state of the DataBase without taking into account the newly input Data Collection Forms and Control Data Collection Forms i.e. as of March, 01 .01).

To use the received data in DataBase for bringing them in accordance with the initial information presented on paper documents the special user's dialogue was elaborated. This dialogue enables one to print the required information as a special form with all necessary data that are needed for initial document search and for the entry correction.

The outcome document form is presented in Annex 2. In this document designed as a specimen for the field "Institution Code" the entries complete list is presented requiring correction as well as some additional fields making it possible to distribute quantitatively the revealed lack of coincidence or error between the operators and technicians.

Similar operation was performed as to all discrepancies correlated with the institutions where DCF were made. It enables to quantitatively estimate quality of the work performed by the operators and technicians.

Juxtaposition of the DCF will follow the range and consistency check using the bulk array of the data. Such operation is convenient to perform which makes it possible to carry out such analysis weekly. It will allow timely correction of the data in the DataBase.

Subsequently, the weekly presented information of such a kind will make it possible to present the dynamics of the DB brought in conformity with the information on the paper sources (DCF & CDCF).

At present an algorithm is developed and code is written for some procedures of the quality-automated control.

During joint discussion of the procedures developed together with Drs.G.Howe and T.Thomas on March, 16,200 1 it was recommended to make changes and supplements to the algorithm of the automated quality control. Now the work is in progress to realize these recommendations.

The program software available meets the requirements of the task posed.

The procedure of the range and consistency check is being systematically accomplished since March, 19, 2001.

Nowadays the procedure of the **double entry** has not been completed yet. Double entry of DCF and CDF will be maintained in separate files not connected with each other to allow the same data input by different operators,

D 10. Start preparation of the Operation Manual for the tasks above.

During the quarter the work was in progress to compile chapters of the Operation Manual.

The Operation Manual will involve description of all the procedures aforementioned.

E. DOSIMETRY

E.l. EPR-dosimetry.

39 of 40 doses were estimated in order to provide high precision reference for RADRUE testing. Their distribution over the dose ranges is the following (table 8):

Table 8.

<50 mGy	50-100 mGy	100-150 mGy	150-200 mGy	200-250 mGy	250-300 mGy
23	10	2	2	1	1

The dose range is O-300 mGy, although high fraction of subjects lay in the range O-50 mGy. The majority of subjects are residents of Kyiv and Kyiv Oblast (24 subjects), 13 - Kharkiv, 2 - Dnipropetrovsk.

In order to ensure correctness of EPR measurements it is envisaged to collaborate with NIST in order to verify that the irradiation source (^{137}Cs) is properly calibrated and to continue comparative analyses using exposed teeth on a regular basis. An Interagency Agreement between NCI and NIST is prepared at NCI. In the framework of this comparison, alanine dosimeters were delivered from NIST to Kiev, exposed by 3 different doses and returned to NIST for analysis.

E2. Collection of biodosimetric material.

157 teeth were obtained during the reported period involving 106-from Kyiv city and oblast, 15 from Chernihiv oblast, 20 from Kharkiv, and 16 from Cherkasy oblast.

E4. Investigation of the data from the Ministry of Defense.

Formation of a database of the official doses of military clean-up workers by the group from the Ministry of Defense (Dr.Skaletsky) is based on the analysis of documents that are kept at the Branch State Archive of the Ministry of Defense of Ukraine. The work was done in the several stages.

At the first stage, investigation and systematization of a large amount of different documents were done and a special catalogue was created.

At the second stage, the optimal data format was worked out and selection of the most informative sources of data for database fields was done. One of the most effective sources could be unit logbooks of registration of exposure doses. Unfortunately, it was found that for about 60% of units these logbooks are destroyed "due to heavy decontamination" (as indicated in the archive) or are absent by unknown reasons. In this case, the search is conducted in the following documents: the logbook of alphabetical registration, the logbook of orders of the unit commander concerning missions to the radiation-dangerous zone, the log book of orders of the unit commander over combatant department or unit financial documents. Besides, such fields as number of a record, number of military unit, place of disposition during clean-up, name and initials of clean-up worker, period of service, dose of exposure.

Originally, the database format also included information about profession of clean-up workers, number of trips to the radiation-dangerous zone and type of work.However, search of such an extensive information processed at very low speed, allowing to enter into the database no more that 12-20 persons per day. Optimization of content of information revealed that the most labor -intensive process is a search of data about trips to the radiation-dangerous zone, professions, object and type of work. On the other hand these fields have little information for search and identification of individuals. After elimination of these fields, the rate of data input increased 10 times (estimated by number of input records) without essential decrease of information.

Thus, currently the following fields are being entered into the database:
- name,
- surname (or initial if not available);
- patronymic (or initial if not available);
- military rank;

- place of disposition;
- date of arrival;
- number of arrival order;
- date of discharge;
- number of discharge order;
- number of military unit;
- number of archive file;
- military registration and enlistment office (for reservists) or unit number (for active military staff).

Accuracy of information input is controlled by a qualified registrator every day; if information is issued by request of a customer, it is double checked by the head of a proper subdivision where the data are extracted from.

At present time (the third stage), in parallel with this wok, the search of lost archives of some units is conducted. In addition available documents of the HQ of Kiev military district are concerned as possible sources of dosimetric information for military staff sent on mission to the 30-km zone. For example, in cooperation with the Cherkasy Oblast military registration and enlistment office, the information about staff listing, dates of service and doses for the recruited reservists who served in the military unit 57278 had been collected. Besides, a large amount of dosimetric information is found in the documents of the personnel department of Kiev military district. Duty orders for special dangerous work of staff that worked at the roof of the 3 Unit of ChNPP in November-December 1986 are gathered as well.

Now the special attention is paid to data on personnel recruited for so called "training" in Chemihiv, Dnipropetrovsk, Kharkiv and Kyiv Oblast and those who worked at clean-up in 1986, 1987 and 1988.

E.5. FISH-dosimetry.

During the second quarter the work was in progress to search and form the representative «high-dose» group of Chernobyl clean-up workers from National Registry (20 persons) and Military Registry (30 persons). The official radiation doses were 300 mGy and

above for cytogenetical examination using FISH method and verification of the official dose records (ODR).

For FISH dosimetry 15 clean-up workers were selected (including 4 from National Registry and 11 from Military Registry) with ODR ranging from 300 to 720 mGy, the following procedures being accomplished:

- the venous blood samples were obtained;
- the culture of peripheral blood lymphocytes was established;
- the preliminary slides for quality control were prepared;
- the bank of frozen fixed pellets from culturing lymphocytes stored under the temperature - 20° C was created;.
- the slides of metaphase chromosomes were prepared and coded to be processed using DNA-probes according to FISH-technique;
- fluorescence *in* situ hybridization (with directly labeled by *Spectrum Orange* DNA-probes to chromosomes 1, 2, 4) on slides received from 10 persons was fulfilled , the reagents for FIFH-method being borrowed.
- cytogenetic fluorescence analysis of metaphase chromosomes slides received form 5 clean-up workers was performed.

The data of the chromosome analysis as well as ODR and biological doses estimated using the frequency of complete (reciprocal) translocations are presented in the Table 9.

Table 9

The results of FISH analysis of 5 Chernobyl clean-up workers

#	Code	ODR (Gy)	Metaphase scored	Translocations		Other	Total	FISH dose (Gy)
				Comp-lete	Incom-plete			
1	6_03.07	0,50	762	8,00	2,00	1,oo	11,oo	0,56
2	1-23.04	1,42	1000	15,00	2,00	1,00	18,00	0,69
3	4_23.03	0,72	1000	7,00	1,oo	1,oo	9,00	0,44
4	2_14.10	0,49	972	15,00	3,00	1,oo	19,00	0,70
5	2_02.12	0,42	1000	6,00	3,00	2,00	11,oo	0,40

As it is seen from the table in cases ## 2 and 3 official doses were higher than FISH ones (1.42 - 0.69 Gy and 0.72 - 0.44 Gy, respectively), in case # 5 FISH dose (0.70 Gy) slightly exceeded the estimated official dose (0.49 Gy), in cases ## 1 and 4 official and biological doses were actually the same (0.50 - 0.56 Gy та 0.42 - 0.40 Gy, respectively).

Thus, during two quarters of the second phase of the Leukemia project the so- called ((high-dose)) group of clean-up workers (with official exposure doses of 300 mGy and above) has been formed; the fixed pellets of culturing peripheral blood lymphocytes from 30 persons have been received; the metaphase chromosome slides from 10 persons have been processed using FISH technique; using the results of the cytogenetical analysis the biological doses of exposure for 5 persons have been reconstructed.